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Health Consultation

DIAMOND STATE SALVAGE

WILMINGTON, NEW CASTLE COUNTY, DELAWARE

CERCLIS NO. DE0000122218

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service

Agency for Toxic Substances and Disease Registry

Division of Health Assessment and Consultation

Atlanta, Georgia 30333

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Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

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CERCLIS NO. DE0000122218

Prepared by:

Exposure Investigation and Consultation Branch
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

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BACKGROUND AND STATEMENT OF ISSUES

The U.S. Environmental Protection Agency (EPA) Region III requested the Agency for Toxic Substances and Disease Registry (ATSDR) to evaluate the health implications associated with exposure to contaminated (e.g., metal, polychlorinated biphenyls [PCBs]) sediments in Brandywine Creek. Specifically, EPA would like to know if a sediment removal action would be protective of human health.

Brandywine Creek is located in New Castle County, Wilmington, Delaware. Diamond State Salvage Site, a 4.5 acre inactive site located on the northeast bank of Brandywine Creek, is believed to be the source of Brandywine Creek sediment contamination. The site is fenced, but, the fence has holes in it that allows easy access. From 1942 until 1992, the site was used as a scrap metal recovery facility. Operations consisted of cutting various items into sections (e.g., appliances, automobiles, empty tanks, drums), and shipping the copper, iron, brass, and lead from these items to different buyers.

The southeastern border of the site is a mixture of vacant lots, buildings and small scale industries [2]. About 1,469 residents live within 1/4 mile of the site.

Surface water from the site flows down gradient and empties into Brandywine Creek. Marsh wetlands are located along the creek. The Brandywine Creek flows in a south to southeastern direction to Christina River about 1.4 miles away. Christina River eventually flows into the Delaware River about 3.2 miles away from the site. Both rivers are used for recreation and fishing [2].

EPA contracted with the Delaware Natural Resource and Environmental Conservation (DNREC) Site Investigation Restoration Branch to investigate the magnitude and extent of sediment contamination in Brandywine Creek [1]. In 1996, a Remedial Investigation of sediment and surface water was conducted using field screening methodology [1]. The results revealed the presence of PCBs, lead, copper, mercury, and zinc in areas near the site. Four sediment samples were collected from along each transect across the creek at a depth of 3 - 4 inches. The transects were located at approximately 200 foot intervals beginning about 1,000 feet downstream of the site to about 500 feet upstream of the site [1].

The sediment samples were analyzed for PCBs, polyaromatic hydrocarbons (PAHs), and various metals. Samples were chosen for PCB homolog analysis on the basis of an immunoassay screening analysis. A total of 40 samples were screened, and 12 samples showing positive results using the screening analysis were further analyzed. The results of homolog analysis for the 12 sediment samples showed PCBs at concentrations ranging from 0.011 to 0.370 parts per million (ppm). The average for the 12 samples was 0.15 ppm.

If the assumption can be made that the screened sample set represent the area of the Brandywine Creek sampled, then the 95% UCL estimate of the mean for the area based on the 12 samples is 0.213 ppm. Given that 28 of the 40 samples did not pass the screening analysis test, it is likely that the true mean PCB concentration for this part of Brandywine Creek is well below 0.213 ppm. For example, if the reported detection limit for the screening method (0.0125 ppm) is used for the 28 remaining samples, then the average for this area of Brandywine Creek is 0.054 with a 95% UCL estimate of mean of 0.081 ppm.

Most of the PAHs analyzed in sediment samples were not detected. The remainder was reported at estimated values. The various metals that were detected in the sediment samples were below their respective background levels for natural soils.

DISCUSSION

Polychlorinated biphenyls are a group of man-made chemicals that are widely distributed as environmental pollutants. They are considered to be probable human carcinogens by EPA. Their persistence in the environment and bioaccumulation potential in fish and animal tissue are major contributing factors for levels of PCBs commonly found in the blood and fat tissue of the general population [3]. Polychlorinated biphenyls have a low solubility in water, but have a high affinity for adsorption onto organic particulates. These particulates settle onto existing sediments in areas of slower current, that are referred to as deposition areas.

Polychlorinated biphenyls were detected in sediment samples collected from Brandywine Creek at concentrations below levels of concern for direct exposure (i.e., through ingestion or dermal contact). Various metals were also detected in these samples below their respective background levels for natural soils. Generally, the impetus for PCBs clean-up is the impact on aquatic life and human consumption of aquatic life [4]. Therefore, EPA has developed interim sediment quality criteria for several organic chemicals such as PCBs. Briefly, these interim sediment quality criteria are based on assumptions that address equilibrium partitioning, toxicity to aquatic life, and bioaccumulation of the chemicals by benthic organisms [5].

Using assumptions for biota sediment accumulation factor (1.85) and tissue lipid content (3%) in EPA's National Sediment Quality Survey and site specific considerations for sediment organic carbon content (2.5%), a mean sediment concentration of 0.081 ppm would not present a health hazard. A mean sediment concentration of 0.213 ppm may present a health hazard, if fish consumption rates of trophic level 4 fish from Brandywine Creek were consumed more than approximately once a month.

Given the large uncertainty associated with biota sediment accumulation factor analysis, in the event that 0.213 ppm is accepted as the true mean it would be prudent to sample fish tissue from the creek before significant actions are taken based on current sediment levels and the fish consumption exposure pathway alone.

At this site (Brandywine Creek), there was no information provided to indicate that recreational activities occur, except for recreational fishing. There were data provided to suggest that PCBs are bioaccumulating in fish to unacceptable levels. However, there were no data indicating high fish consumption rates. Most of the PAHs analyzed was not detected, and the ones reported were expressed as estimated values, because the results were below the instrumentation detection limits.

Creek sediment PCBs and other contaminants are generally unavailable for direct human exposure, unless the sediments are disturbed and ingested while engaging in recreational activities at the creek, such as swimming. Exposures resulting from these activities would not present a health hazard. Additionally, metals detected in samples from this site are not elevated in comparison to natural soils.

The closest residential well is about 2 miles from the creek. It is believed that most of the residents who live nearby are using the municipal water system for potable purposes.

CONCLUSIONS

1. Based on the data reviewed, concentrations of PCBs detected in sediment along Brandywine Creek may pose a potential health hazard to subsistence fisherman who consume the contaminated fish. Furthermore, PCBs contaminated sediment may serve as a continuing source of contamination for bottom feeding fish.
2. The available sediment samples represent one point in time, and the direction of change in sediment PCBs concentrations is not known (i.e., it is not known whether they will increase or decrease in the future). Therefore, it would be prudent to assess soils on site with regard to their potential for future sediment contamination and consider remediation of those soils on the basis of estimated future risk.

RECOMMENDATION

Assess onsite soils with regard to their potential as a source for future sediment contamination and fish tissue contamination.

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[Signature]

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REFERENCES

1. Sediment Investigation Report for Diamond State Salvage Site, prepared by Delaware Department of Natural Resources and Environmental Control, September 1997.
2. Data Package for Diamond State Salvage Site, from Kevin Koob, EPA Region 3 to Charles Walters, ATSDR Region 3, August 16, 1995.
3. ATSDR's Update Toxicological Profile for PCBs, February 20, 1996.
4. EPA's Quick Reference Fact Sheet, A Guide on Remedial Actions at Superfund Sites With PCB Contamination, August 1990.
5. The Incidence and Severity of Sediment Contamination in Surface Waters of the United States, Volume 1: National Sediment Quality Survey, U.S. EPA, September 1997.
6. E-mail from Kevin Koob, EPA Region 3 to Tom Stukas, ATSDR Region 3, March 4, 1998.